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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/801,076	03/15/2004	Francis X. Bostick III	WEAT/0474	9469
36735	7590	09/02/2005	EXAMINER	
MOSER, PATTERSON & SHERIDAN, L.L.P. 3040 POST OAK BOULEVARD, SUITE 1500 HOUSTON, TX 77056-6582			GARBER, CHARLES D	
			ART UNIT	PAPER NUMBER
			2856	

DATE MAILED: 09/02/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

AK

**Office Action Summary**

Application No.

10/801,076

Applicant(s)

BOSTICK, FRANCIS X.

Examiner

Charles D. Garber

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 19 August 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-35 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-3, 6-22, 27-32, 34 and 35 is/are rejected.
- 7) ☒ Claim(s) 4, 5, 23-26 and 33 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

### **DETAILED ACTION**

In accordance with 37 CFR 1.105 Examiner requires the submission, from individuals identified under § 1.56(c), or any assignee, such information as may be reasonably necessary to properly examine or treat the matter. This includes:

non-patent literature related to four-dimension vertical seismic profiling.

Non-patent literature related to use of in-phase upwave and downwave amplitudes measured by sensors and anti-phase downwave and upwave amplitudes measured by hydrophones and separation of downwaves and upwaves

### ***Election/Restrictions***

Applicant's election with traverse of claims 1-28 in the reply filed on 08/19/2005 is acknowledged. The traversal is on the ground(s) that Examiner's basis for making distinction between the inventions is moot based on amendment. Examiner agrees and all claims will be prosecuted.

### ***Drawings***

The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the "mandrel" must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure

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is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

***Claim Rejections - 35 USC § 112***

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claim 16 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

The disclosure does not describe how to carry out or identify a source or further instruction in the use of "four-dimension vertical seismic profiling". One having ordinary skill in the art would not know how to perform four-dimension vertical seismic profiling without undue experimentation. For purposes of further examination Examiner will assume the scope of the claim simply encompasses vertical seismic profiling.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1, 3, 7-11 and 29 are rejected under 35 U.S.C. 102(e) as being anticipated by Knudsen et al. (US Patent 6,575,033).

The applied reference has a common assignee with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 102(e) might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not the invention “by another,” or by an appropriate showing under 37 CFR 1.131.

Regarding claims 1, 10, 20 and 29, Knudsen discloses an apparatus ... “includes an optical signal processor connected to [an] optical transmission cable for providing seismic profile information based on the respective sensing light signal.” The apparatus comprises highly sensitive accelerometers 22 for measuring the seismic activity. The apparatus provides “seismic profiling of an earth borehole having an x-direction, a y-direction, and a z-direction orthogonal to each other” as in the instant invention. The

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apparatus is shown in figure 2 lowered into a structure 10 which may be a borehole for an oil or gas well (column 5 lines 11-12). The "structure 10 [is] coupled to at least one accelerometer 22". The "optical fiber transmission cable [that] includes a plurality of linear accelerometers coupled to the borehole and in optical communication with the optical fiber transmission cable" is considered to be substantively the same as the waveguide of the instant invention.

As for claims 3 and 7, as noted above, the invention "includes a **plurality** of linear accelerometers coupled to the borehole and in optical communication with the optical fiber transmission cable".

As for claims 8, 9 and 34, the reference recites "[a]rrays of such interferometer based **accelerometers** may be **multiplexed** using known techniques."

As for claims 11 and 30, the reference recites "structure 10 [to which the accelerometers are coupled as noted above] may be any structure, such as a casing"

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.

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2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 20, 22, 27 and 31 are rejected under 35 U.S.C. 103(a) as being obvious over Knudsen et al. (US Patent 6,575,033) in view of Berg et al. (US Patent Application 2004/0067002).

The applied reference has a common assignee with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art only under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 103(a) might be overcome by: (1) a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not an invention "by another"; (2) a showing of a date of invention for the claimed subject matter of the application which corresponds to subject matter disclosed but not claimed in the reference, prior to the effective U.S. filing date of the reference under 37 CFR 1.131; or (3) an oath or declaration under 37 CFR 1.130 stating that the application and reference are currently owned by the same party and that the inventor named in the application is the prior inventor under 35 U.S.C. 104, together with a terminal disclaimer in accordance with 37 CFR 1.321(c). This rejection might also be overcome by showing that the reference is disqualified under 35 U.S.C. 103(c) as prior art in a rejection under 35 U.S.C. 103(a). See MPEP § 706.02(I)(1) and § 706.02(I)(2).

The Knudsen reference as applied to claim 1 above does not expressly teach hydrophones and seismic sensors.

Berg teaches "one skilled in the art will understand, the acoustic signals within the well annulus as measured by the hydrophone 180 and the seismic signals measured by the sensor component 150 when coupled to the well casing can be processed to provide an accurate picture of the nature of the reservoir surrounding the borehole in which the sensor mechanism 100 is deployed.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to combine measurement from both hydrophone and seismic sensors in a well bore as this can provide an accurate picture of the nature of the reservoir surrounding the borehole.

Claims 2, 6, 12-15, 32 and 35 are rejected under 35 U.S.C. 103(a) as being obvious over Knudsen et al. (US Patent 6,575,033) in view of Linyaev et al. (US Patent 6,910,534).

Regarding claims 6 and 12, 13, 32, 35, the Knudsen reference as applied above to claims 1 and 29 does not expressly teach the sensors in a clamping mechanism that disposes the sensors against the casing.

Linyaev teaches "sensor **clamp** assembly 100". The "system ... securely fixes a sensor ... such that the sensor is coupled to the casing regardless of the orientation of the tubing within the wellbore."

It would have been obvious to one having ordinary skill in the art at the time the invention was made to mount the sensors within a clamp assembly so the sensor may be coupled to the casing regardless of the orientation of the tubing within the wellbore and ensure proper measurement by the sensors.



As for claims 14, 15, Linyaev further teaches portions 300 and 400 which may be considered a mandrel supporting the sensors 130, cables 140 and contact members 129 on tubing 110. It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide a mandrel in order support the sensors, cables and contact points on the tubing.

As for claim 2, Linyaev teaches the tubing 110 to which the sensors are mounted may also be "production tubing" "for carrying out localized measurements of the nearby annulus or for monitoring fluid flowing through the production tubing." It would have been obvious to one having ordinary skill in the art at the time the invention was made to mount the assembly on a production tubing or pipe lowered in the well in order to carry out localized measurements of the nearby annulus or to monitor flowing fluid.

Claim 21 is rejected under 35 U.S.C. 103(a) as being obvious over Knudsen et al. (US Patent 6,575,033) as modified by Berg et al. (US Patent Application 2004/0067002) and applied to claim 20 above and further in view of Linyaev et al. (US Patent 6,910,534).

the references as applied above do not expressly teach the sensors affixed to a production pipeline lowered in the well.

Linyaev teaches the tubing 110 to which the sensors are mounted may also be "production tubing" "for carrying out localized measurements of the nearby annulus or for monitoring fluid flowing through the production tubing."

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It would have been obvious to one having ordinary skill in the art at the time the invention was made to mount the assembly on a production tubing or pipe lowered in the well in order to carry out localized measurements of the nearby annulus or to monitor flowing fluid.

Claim 16 is rejected under 35 U.S.C. 103(a) as being obvious over Knudsen et al. (US Patent 6,575,033) in view of admitted prior art (Admission).

Knudsen as applied to claim 1 above does not expressly teach carrying out four-dimensional vertical seismic profiling.

Admission recites "[c]onventional borehole seismic techniques, such as vertical seismic profiling ("VSP"), have been utilized for many years. VSP typically involves suspending an array of geophone sensors temporarily in the wellbore on a wireline, while actuating a seismic source at the surface. The sound waves generated by the source penetrate the earth and are reflected by rock and fluid interfaces, with the reflected signals being picked up by the geophones. As the surface source and/or geophone array is moved, a different set of reflections is received, helping to build up a seismic image of the subsurface in the vicinity of the well. Compared with normal seismic surveys which have both source and sensors at the surface, the result is a more detailed image of the reservoir, in which the distance that can be `seen` from the wellbore is roughly determined geometrically by the depth of the well and the sensor locations.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to perform VSP because the result is a more detailed image of the reservoir compared with normal seismic surveys.

Claims 17-19 are rejected under 35 U.S.C. 103(a) as being obvious over Knudsen et al. (US Patent 6,575,033) in view of Bailey (US Patent 6,488,116)

Knudsen as applied above does not expressly teach seismic events comprise one or more micro-seismic events correlated to production activity such as gas injection.

Bailey teaches “[w]ellbore acoustic receivers for detecting microseismic events or acoustic waves in a well have become widely available in recent years...[and is] used to determine the source location.” Such events may be caused by “fluid is injected through the wellbore and into the formation at a high flow rate and at a pressure greater than the earth stress in the formation. This causes fractures to form in the formation, which fractures generally begin at the wellbore and radiate laterally away from the wellbore. **It is desirable to know the length and direction (azimuth angle) of the fracture extending away from the well in order to predict with greater accuracy the influences of the fracture on the flow of fluids in the zone of interest**”.

Detecting these events is carried out by “[c]onventional acoustic receivers [that] typically have three mutually orthogonal seismic sensors (geophones or accelerometers) for collecting three-component (i.e., x,y,z) data and include means for coupling the receivers to the casing of a well. The seismic signals received are transmitted to the surface of the earth by various means (e.g., conventional wireline) and are then processed to determine the seismic source location.”

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It would have been obvious to one having ordinary skill in the art at the time the invention was made to measure microseismic events caused by fluid injection fracturing in order know the length and direction (azimuth angle) of the fracture extending away from the well to predict with greater accuracy the influences of the fracture on the flow of fluids in the zone of interest.

Examiner takes Official Notice that it is widely known to use gas as the fluid injected in wellbores. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use gas as this will remain separate from the petroleum the fluid is intended to displace.

Claim 28 is rejected under 35 U.S.C. 103(a) as being obvious over Knudsen et al. (US Patent 6,575,033) as modified by Berg et al. (US Patent Application 2004/0067002) and applied to claim 20 above and further in view of Bailey (US Patent 6,488,116)

Knudsen as applied above does not expressly teach seismic events comprise one or more micro-seismic events.

Bailey teaches "[w]ellbore acoustic receivers for detecting microseismic events or acoustic waves in a well have become widely available in recent years...[and is] used to determine the source location." Such events may be caused by "fluid is injected through the wellbore and into the formation at a high flow rate and at a pressure greater than the earth stress in the formation. This causes fractures to form in the formation, which fractures generally begin at the wellbore and radiate laterally away from the wellbore. **It is desirable to know the length and direction (azimuth angle) of the**

**fracture extending away from the well in order to predict with greater accuracy the influences of the fracture on the flow of fluids in the zone of interest”.**

Detecting these events is carried out by “[c]onventional acoustic receivers [that] typically have three mutually orthogonal seismic sensors (geophones or accelerometers) for collecting three-component (i.e., x,y,z) data and include means for coupling the receivers to the casing of a well. The seismic signals received are transmitted to the surface of the earth by various means (e.g., conventional wireline) and are then processed to determine the seismic source location.”

It would have been obvious to one having ordinary skill in the art at the time the invention was made to measure microseismic events may be monitored in conjunction with fluid injection fracturing in order to predict with greater accuracy the influences of the fracture on the flow of fluids in the zone of interest.

#### ***Allowable Subject Matter***

Claims 4, 5, 23-26 and 33 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

#### ***Conclusion***

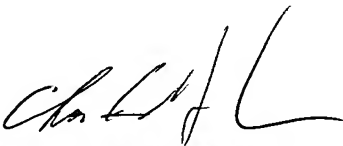
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Charles D. Garber whose telephone number is (571) 272-2194. The examiner can normally be reached on 6:30 a.m. to 3:00 p.m..

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hezron Williams can be reached on (571) 272-2208. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

cdg



**CHARLES GARBER**  
**PRIMARY EXAMINER**